MULTIMEDIA UNIVERSITY

STUDENT ID NO

VENUE : _____

SEAT NO : _____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

TGD 2151 – COMPUTER GRAPHICS FUNDAMENTAL

(All sections / Groups)

2nd MARCH 2020
2.30 p.m. – 4.30 p.m.
(2 Hours)

Question	Mark
1	
2	
3	
4	
Total	

INSTRUCTIONS TO STUDENT

1. This question paper consists of 4 printed pages (including cover page).
2. Attempt all questions. The distribution of the marks for each question is given.
3. Print all your answers **CLEARLY** in the answer booklet provided.

QUESTION 1: [10 marks]

a) Name TWO industries that play an important role in the field of Computer Graphics. How do these industries drive the Computer Graphics technology?

[3]

b) Suppose an RGB raster system is to be designed using a 9 inches by 12 inches screen with a resolution of 150 pixels per inch in each direction. If we want to store 16 bits per pixel in the frame buffer, how much storage (in MB) do we need for the frame buffer?

[2]

c) If we use direct coding of RGB values with 6 bits per primary color, how many possible colors do we have for each pixel?

[2]

d) What color is represented by (0.3, 0.3, 0) in the RGB space? Find the corresponding coordinates of this color in the CMY space. What OpenGL command is used to display the color?

[3]

QUESTION 2: [10 marks]

a) Find the equation for the plane defined by P_1 (1, 0, 1), P_2 (0, 0, 4), and P_3 (0, 2, 5). Also find the distance between this plane to point Q (2, –3, 4).

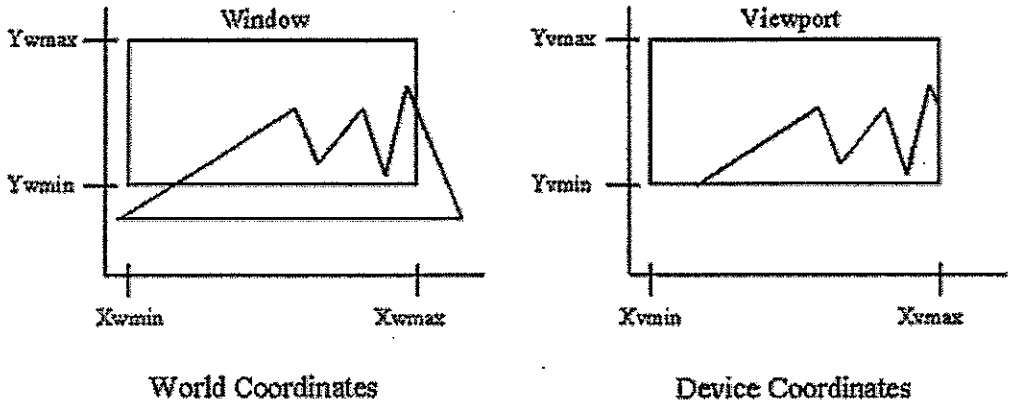
[3]

b) Midpoint algorithm is a line drawing algorithm that determines the points of a raster that should be selected in order to form a close approximation to a straight line between two points. Briefly explain the algorithm to generate a straight line between endpoint (x_0, y_0) and (x_1, y_1) with the line equation $y = mx + c$, where $0 <= m <= 1$.

[4]

c) Write a C++ program to implement the window to viewport transformation in the diagram below.

[3]



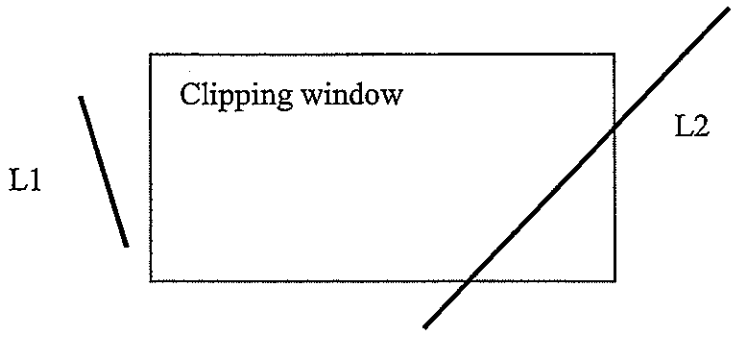
QUESTION 3: [10 marks]

a) Show that a 3D transformation matrix M, for a reflection about the line $y=x$, is equivalent to a reflection relative to the x axis followed by counter-clockwise rotation of 90 degree along the z axis.

[4]

b) Given the diagram below, explain Cohen-Sutherland line clipping algorithm.

[6]



QUESTION 4: [10 marks]

a) What are the differences between flat shading and Gouraud shading?

[2]

b) Given a viewer at location V (4, 2, 0) and a point light source at location L (-5, 5, 1). Compute the total lighting (ambient, diffuse and specular) cast on a point P (1, 0, 0), where the ambient, diffuse and specular light intensity are $I_a = I_d = I_s = 0.8$, the coefficients of the three light effects are $K_a = K_d = K_s = 0.6$, the Specular reflection exponent, $n = 10$ and the normal vector, $N = (0, 1, 0)$.

[5]

c) Briefly discuss the major techniques available to implement surface rendering.

[3]

End of page